

## CLAIMS:

1. A method for deriving and implementing one or more motion profiles, comprising the steps of:

identifying at least one time constraint between a first motor controlled system in an automated device and a second motor controlled system in said automated device;

identifying and supplying known parameters of said first motor controlled system and said second motor controlled system;

creating a first motion profile for said first motor controlled system;

creating a second motion profile for said second motor controlled system;

applying said identified at least one time constraint to said first and second motion profiles to constrain the first and second motion profiles to one another; and

solving said first and second motion profiles to complete a solution having solution information to prepare for use by said first and second motion controlled systems; and

post-processing said solution information for use by said first and second motor controlled systems.

2. The method of claim 1 wherein said step of creating said first motion profile includes the sub-step of creating a first series of blocks each having block constraints including a position constraint input, a position constraint output, a velocity constraint input and a velocity constraint output.

3. The method of claim 2 wherein said sub-step of creating a first series of blocks includes the sub-step of indicating one of a forward constraint, a reverse constraint and a pass-through constraint for each of said block constraints to define the flow of information between adjacent blocks for velocity and position.

4. The method of claim 2 wherein said sub-step of creating said first series of blocks includes the sub-step of selecting at least one of segment blocks, state blocks and stretchy blocks for said first series of blocks wherein said segment blocks have a fixed time duration associated therewith, said state blocks have no

time duration associated therewith, and said stretchy blocks have a variable time duration associated therewith that is determined during the step of post-processing said first and second motion profiles in conjunction with said time constraints.

5. The method of claim 2 wherein said sub-step of selecting at least one of segment blocks, state blocks and stretchy blocks includes the sub-step of selecting and ordering blocks so that said first series of blocks are fully constrained.

6. The method of claim 5 wherein said sub-step of selecting at least one of segment blocks, state blocks and stretchy blocks includes the sub-step of selecting and ordering blocks so that said first series of blocks are not over-constrained.

7. The method of claim 2 wherein the sub-step of selecting at least one of segment blocks, state blocks and stretchy blocks includes the sub-step of selecting test blocks for purposes of resolving conflicting block constraints.

8. The method of claim 1 wherein said sub-step of solving said first and second motion profiles includes the sub-steps of:

using said first and second motion profiles in a solver that applies a recursive algorithm to at least one of (1) identify problems in said first and second motion profiles and (2) complete said solution to said first and second motion profiles.

9. The method of claim 8 wherein the sub-step of using said first and second motion profiles in a solver includes the sub-steps of:

breaking down blocks of the motion profiles into sub-attributes;  
using block constraints of said blocks and constraints inherent in said blocks to build a dependency tree of equations relating to each sub-attribute;  
positioning each end-attribute within said tree of equations; and  
applying said recursive algorithm to complete said solution.

10. The method of claim 1 wherein said step of post-processing includes the sub-step of:

using said solution in a simulator to create a first timing diagram corresponding to said first motion profile and a second timing diagram corresponding to said second motion profile.

11. The method of claim 1 wherein said step of post-processing includes the sub-steps of:

using said solution profile to program a first motor controller to control a first motor of said first motor controlled system and a second motor controller to control a second motor of said second motor controlled system.

12. A method for motion analysis and control in a printer device, comprising the steps of:

identifying time constraints between a printer drum system and a printer head system;

identifying and supplying known parameters of said printer drum system and said printer head system;

creating a printer drum profile and a printer head profile;

using said printer drum profile to program said printer drum system to control motion of a printer drum of said printer drum system; and

using said printer head profile to program said printer head system to control motion of said printer head of said printer head system.

13. The method of claim 12 further including the steps of:

identifying time constraints between said printer drum system, said printer head system, a drum maintenance system and a transfix system;

identifying and supplying known parameters of said drum maintenance system and said transfix-system;

creating a drum maintenance profile and a transfix profile;

using said drum maintenance profile to program said drum maintenance system to control motion of a drum maintenance roller of said drum maintenance system; and

using said transfix profile to program said transfix system to control motion of a transfix roller of said transfix system.

14. The method of claim 12 wherein said step of using said printer drum profile to program said printer drum system includes the sub-step of step of solving said printer drum profile using a recursive algorithm.

15. The method of claim 12 wherein said step of using said printer head profile to program said printer head system includes the sub-steps of:

solving said printer head profile using a recursive algorithm;

repairing said printer head profile if said recursive algorithm indicates an error;

providing one of an output and a solution order to said printer head profile for programming a controller of said printer head system to control motion of said printer head.

16. A apparatus for deriving and implementing one or more motion profiles, comprising:

a means for identifying at least one time constraint between a first motor controlled system of an automated device and a second motor controlled system of the automated device;

a means for identifying and supplying known parameters of said first motor controlled system and said second motor controlled system;

a means for creating a first motion profile for said first motor controlled system and a second motion profile for said second motor controlled system;

a means for applying said identified at least one time constraint to said first and second motion profiles to constrain said first and second motion profiles relative to one another;

a means for solving said first and second motion profiles to complete a solution having solution information; and

a means for post-processing said solution information for use by said first and second motor controlled systems.